Response to Intervention in Elementary and Middle Math

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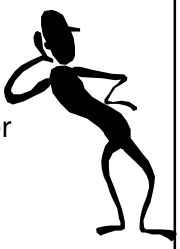
Group Norms



Listening: SLANT
Cell phone reminder
Conversations
Breaks

Bathroom location

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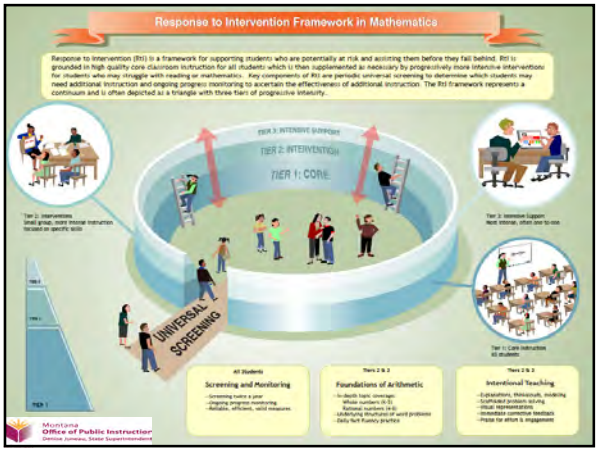

Response to Intervention in Elementary and Middle Math

- **Multimedia Overview: Response to Intervention** **(4:10 min)**

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Montana Response to Intervention: RTI Framework Jigsaw Activity

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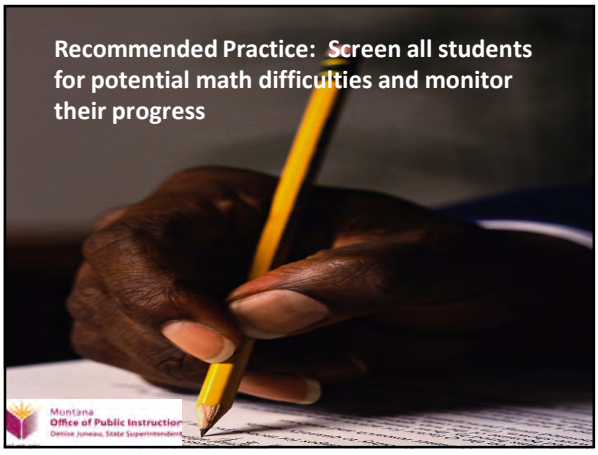

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Key Concepts

- Monitor students regularly
- The RtI team evaluates screening measures using reliability, efficiency, and validity criteria
- Implement twice a year screening

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Create a T-chart

- Please create a T-chart on your paper
- Label one column effective screening system
- Label the other column functions of progress monitoring
- As you listen to the overview, list the recommended components of an effective screening system

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Screen all students for potential math difficulties and monitor their progress

Multimedia Overview: Screening and Monitoring Progress in Math (5:34)

After overview: Share your key points on your T-chart with your table partners

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Montana Assessment System

- Jigsaw Activity
- Number off from 1-5
- Each person reads one assessment section
- Once you have read your section, share the key information with your table partners

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Screen all students for potential math difficulties and monitor their progress

Expert Interview: Universal Screening in Math (5:47)
Anne Foegen, Ph.D., Iowa State University

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Activity

- Examine Resource list from Montana OPI Title I conference
  1. What do you notice about the information provided?
  2. How would this help you in your initial stages of selecting a screening tool?
- Chart your team responses on a chart paper

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Screen all students for potential math difficulties and monitor their progress

Expert Interview: Functions of Progress Monitoring

Anne Foegen, Ph.D., Iowa State University

Listen for the key points on why progress monitoring is essential…

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Screen all students for potential math difficulties and monitor their progress

Presentation: Monitoring Student Progress

- Listen for actions taken by teacher and team
- Record each action mentioned

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Self Assessment on Screening and Progress Monitoring tools

- Examine: **Self assessment tool for data utilization with screening and progress monitoring tools**

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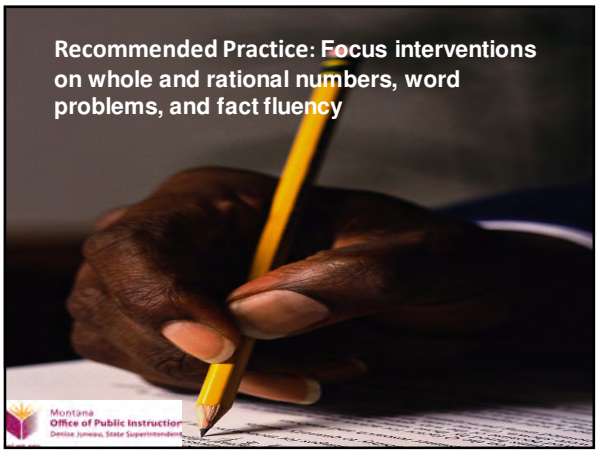

Key Concepts

- Focus kindergarten through fifth-grade interventions on whole numbers
- Focus fourth- through eighth-grade interventions on rational numbers
- Ensure in-depth coverage of math topics
- Interventions on solving word problems should include instruction that helps students identify common underlying structures
- Interventions at all grade levels should devote about ten minutes each session to building fluent retrieval of basic arithmetic facts

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Focus interventions on whole and rational numbers, word problems, and fact fluency

- Multimedia Overview: The Content of Math Interventions (5:47 min)

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Tier II and Tier III content

Elementary: In depth treatment on a limited # of topics-K-4

1. Whole number
2. Strategic counting
3. Number composition
4. Understanding place value
5. Solving problems with whole numbers
6. Underlying meaning of addition and subtraction operations

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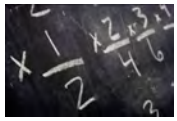
Tier II and Tier III content

Middle School

1. Rational numbers and Operations with fractions, ratios, decimals and percents
2. More complex whole numbers, multiplication and division



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Focus interventions on whole and rational numbers, word problems, and fact fluency

A SYNOPSIS OF A SYNTHESIS OF EMPIRICAL RESEARCH ON TEACHING MATHEMATICS TO LOW-ACHIEVING STUDENTS

Jigsaw OPI document

- Number off 1-5
- Read your section
- Share the key points from your section with your table partners

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Focus interventions on whole and rational numbers, word problems, and fact fluency

Expert Interview: Math Content for Struggling Students

Sybilla Beckmann, Ph.D., University of Georgia

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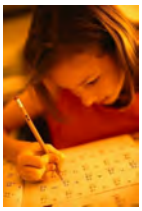
Foundations of Arithmetic

- K-5 recommends focus on numbers and operations
  - Used to tell us how many things
  - Place value, decimal system
  - Operations (addition, subtraction, multiplication, division)
  - How they work, why they work



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Foundations of Arithmetic

- 4-8 Focus on Fractions and Rational number ideas
  - What fractions mean, what they stand for
  - Solve a variety of story problems
  - Reasoning behind methods of calculation for problems they are solving

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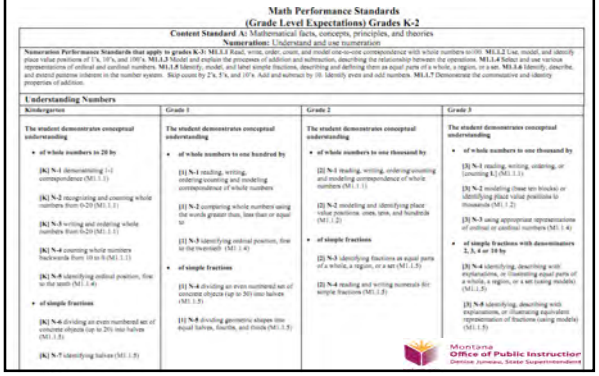
Compare recommendations to Montana State Standards



Math Performance Standards
(Grade Level Expectations) Grades K-2

Content Standard A: Mathematical facts, concepts, principles, and theories
Numeration: Understand and use numeration

Numeration Performance Standards that apply to grades K-3: M1.1.1 Read, write, order, count, and model one-to-one correspondence with whole numbers to 100. M1.1.2 Use, model, and identify place value positions of 1's, 10's, and 100's. M1.1.3 Model and explain the processes of addition and subtraction, describing the relationship between the operations. M1.1.4 Select and use various representations of ordinal and cardinal numbers. M1.1.5 Identify, model, and label simple fractions, describing and defining them as equal parts of a whole, a region, or a set. M1.1.6 Identify, describe, and extend patterns inherent in the number system. Skip count by 2's, 5's, and 10's. Add and subtract by 10. Identify even and odd numbers. M1.1.7 Demonstrate the commutative and identity properties of addition.

Understanding Numbers

Kindergarten	Grade 1	Grade 2	Grade 3
The student demonstrates conceptual understanding • of whole numbers to 20 by [K] N-1 demonstrating 1-1 correspondence (M1.1.1) [K] N-2 recognizing and counting whole numbers from 0-20 (M1.1.1) [K] N-3 writing and ordering whole numbers from 0-20 (M1.1.1) [K] N-4 counting whole numbers backwards from 10 to 0 (M1.1.1) [K] N-8 identifying ordinal position, first to the tenth (M1.1.4) • of simple fractions [K] N-6 dividing an even numbered set of concrete objects (up to 20) into halves (M1.1.5) [K] N-7 identifying halves (M1.1.5)	The student demonstrates conceptual understanding • of whole numbers to one hundred by [1] N-1 reading, writing, ordering/counting and modeling correspondence of whole numbers [1] N-2 comparing whole numbers using the words greater than, less than or equal to [1] N-3 identifying ordinal position, first to the twentieth (M1.1.4) • of simple fractions [1] N-4 dividing an even numbered set of concrete objects (up to 20) into halves (M1.1.5) [1] N-5 dividing geometric shapes into equal halves, fourths, and thirds (M1.1.5)	The student demonstrates conceptual understanding • of whole numbers to one thousand by [2] N-1 reading, writing, ordering/counting and modeling correspondence of whole numbers (M1.1.1) [2] N-2 modeling and identifying place value positions: ones, tens, and hundreds (M1.1.2) • of simple fractions [2] N-3 identifying fractions as equal parts of a whole, a region, or a set (M1.1.5) [2] N-4 reading and writing numerals for simple fractions (M1.1.5)	The student demonstrates conceptual understanding • of whole numbers to one thousand by [3] N-1 reading, writing, ordering, or [counting by] (M1.1.1) [3] N-2 modeling (base ten blocks) or identifying place value positions to thousands (M1.1.2) [3] N-3 using appropriate representations of ordinal or cardinal numbers (M1.1.4) • of simple fractions with denominators 2, 3, 4 or 10 by [3] N-4 identifying, describing with explanations, or illustrating equal parts of a whole, a region, or a set (using models) (M1.1.5) [3] N-5 identifying, describing with explanations, or illustrating equivalent representation of fractions (using models) (M1.1.5)

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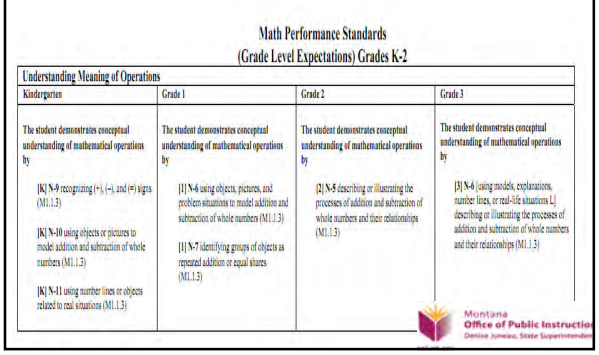
Compare recommendations to Montana State Standards



Math Performance Standards
(Grade Level Expectations) Grades K-2

Understanding Meaning of Operations

Kindergarten	Grade 1	Grade 2	Grade 3
The student demonstrates conceptual understanding of mathematical operations by [K] N-9 recognizing (+), (–), and (=) signs (M1.1.3) [K] N-10 using objects or pictures to model addition and subtraction of whole numbers (M1.1.3) [K] N-11 using number lines or objects related to real situations (M1.1.3)	The student demonstrates conceptual understanding of mathematical operations by [1] N-6 using objects, pictures, and problem situations to model addition and subtraction of whole numbers (M1.1.3) [1] N-7 identifying groups of objects as repeated addition or equal shares (M1.1.5)	The student demonstrates conceptual understanding of mathematical operations by [2] N-5 describing or illustrating the processes of addition and subtraction of whole numbers and their relationships (M1.1.3)	The student demonstrates conceptual understanding of mathematical operations by [3] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the processes of addition and subtraction of whole numbers and their relationships (M1.1.3)

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Focus interventions on whole and rational numbers, word problems, and fact fluency

The Missing Partners Game,
-Worthington Hooker School, Connecticut

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Compare recommendations to Montana State Standards

Numeration Performance Standards that apply to grades 4-6: M1.2.1 Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers. **M1.2.2** Use, model, and identify place value positions from 0.001 to 1,000,000. **M1.2.3** Model and explain the processes of multiplication and division. Describe the relationships among the four basic operations. **M1.2.4** Identify and describe different uses for the same numerical representation. **M1.2.5** Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money. **M1.2.6** Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers. **M1.2.7** Demonstrate the commutative and identity properties of multiplication.

Measurement Performance Standards that apply to grades 4-6: M2.2.1 Estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems. **M2.2.2** Identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week). **M2.2.3** Use a variety of measuring tools; describe the attribute(s) they measure. **M2.2.4** Estimate and measure the dimensions of geometric figures. **M2.2.5** Tell time using analog and digital clocks identifying AM and PM; find elapsed time. **M2.2.6** Read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation.

Grade 5			
Understanding Numbers	**Understanding Meaning of Operations**	**Number Theory**	**Measurable Attributes**
The student demonstrates conceptual understanding • **of whole numbers to millions by** [5] N-1 reading, writing, ordering, or [counting L] (M1.2.1) [5] N-2 identifying place value positions from tenths to millions (M1.2.2) [5] N-3 converting between whole numbers written in expanded notation and standard form (M1.2.4) • **of positive fractions with denominators 1 through 12 and 100 with proper and mixed numbers and benchmark percents (10%, 25%, 50%, 75%, 100%) by** [5] N-4 modeling, identifying, describing with explanations, or illustrating equal parts of a whole, a region, or a set (M1.2.4)	**The student demonstrates conceptual understanding of mathematical operations by** [5] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of division and its relationship to subtraction or to multiplication (M1.2.3) [5] N-7 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding and subtracting proper fractions or mixed numbers (like denominators) (M1.2.5) [5] N-8 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding or subtracting decimals that represent money (M1.2.5)	**The student demonstrates conceptual understanding of number theory by** [5] N-9 describing or illustrating commutative or identity properties of addition or multiplication using models or explanations (M1.2.7) [5] N-10 identifying or listing factors and multiples common to a pair or set of numbers (M1.2.6)	**The student demonstrates understanding of measurable attributes by** [5] MEA-1 estimating length to the nearest one-fourth inch or centimeter (L) (M2.2.1) [5] MEA-2 estimating temperature (degree Celsius or Fahrenheit, plus or minus 5 degrees) or weight (half-pounds or kilograms) to the nearest unit (L) (M2.2.1) [5] MEA-3 identifying or using equivalent measures for weight/mass (16 oz. = 1 pound or 1000 grams = 1 kilogram), length (1000 millimeters = 1 meter), or time (M2.2.2)

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View Video

- **Expert Interview: Word Problems**
  Sybilla Beckmann, Ph.D., University of Georgia (5:31 min)

Listen for the reasons why word problems can be particularly difficult for students

- What are structures of word problems?
- What are unreliable ways of approaching word problems?

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Prior to Hearing Audio

- Use Four Square graphic organizer…
- Was *the intervention content mostly focused on the recommended math topics?*
- *Are intervention materials focused on the recommended topics? Are materials adequate for students who require many examples and much practice?*
- *How are students in Tier 2 and Tier 3 being taught to solve word problems?*
- *How much emphasis do interventionists place on developing fact fluency, and to what extent do they employ strategic approaches?*

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Focus interventions on whole and rational numbers, word problems, and fact fluency

- Listen to Audio: Reteaching Place Value Media (5:42min)
  - Reteaching Place Value: Focus of instruction for intervention groups

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Reteaching Place Value

- Inside/Outside Circle
- Share contents of Four Square recordings

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Wrap Up

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Key Concepts

- Tier 2 and Tier 3 math instruction should provide clear explanations with thinkalouds.
- Explicit teaching includes guided practice with scaffolding of the required problem-solving steps.
- Guided practice should include immediate corrective feedback
- Use visual representations to explain math concepts.
- Praise student effort and engagement.

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Provide explicit instruction and incorporate visual representations and motivational strategies

- **Multi-media Overview: The Instructional Process in Intervention (6:31)**
- Number off from 1-4

  - #1's & 3's-List the characteristics of explicit instruction
  - #2's & 4's -List the key features of using concrete examples

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M & M activity

- Each team member selects an m & m color.
- Beginning with #1 :
  - Share one key feature from explicit instruction
  - Then #3 shares, then back to #1
  - Continue until M & M's are gone or ideas are all shared
- Then proceed with #2's and #4's in same pattern (sharing info on using concrete examples)

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Provide *explicit instruction* and incorporate visual representations and motivational strategies

- **Expert Interview: Explicit Instruction**
  Bradley Witzel, Ph.D., Winthrop University
  (4:55 Min)

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Provide *explicit instruction* and incorporate visual representations and motivational strategies

- Listen to Audio: Explicit Teaching in the Fifth-Grade Math Core (4:06)
  - List the steps she describes for delivering explicit instruction
  - Think-Pair-Share the steps with your partner

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Provide *explicit instruction* and incorporate visual representations and motivational strategies

- Explicit teaching steps
  - Explicit vocabulary instruction
  - TAPPLE
  - Scaffold problem solving
  - Student engagement (partner share)
  - Check for understanding
  - Regrouping students (goal setting)
  - Teacher collaboration
  - Ongoing teacher training

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Provide explicit instruction and *incorporate visual representations* and motivational strategies

Concrete-Representational-Abstract (CRA) Instructional Approach Summary Report

- Scan page 1 from the Summary report
- Listen for the details of Concrete-Representational-Abstract approach
- Record key information from the video

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Provide explicit instruction and *incorporate visual representations* and motivational strategies

- **Expert Interview: Visual Representations**
  Bradley Witzel, Ph.D., Winthrop University
  (4:04 min)

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Provide explicit instruction and *incorporate visual representations* and motivational strategies

- *Concrete: The "doing" stage using concrete objects to model problems*
- *Representational: The "seeing" stage using representations of the objects to model problems*
- *Abstract: The "symbolic" stage using abstract symbols to model problems*

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Provide explicit instruction and *incorporate visual representations* and motivational strategies

- Listen to Audio: Concrete to Abstract (6:42 min)
- Concrete to Abstract Sequence
  - How did she structure the lesson?
  - How did she move from concrete to abstract during the lesson?

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Share

- Share information for each section of the completed table with your table partners
- Chart common responses for each category

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Provide explicit instruction and incorporate visual representations and motivational strategies

Planning for Visual Representations http://dww.ed.gov DOINGWHATWORKS

Planning for Visual Representations

This planning document is designed to help interventionists provide Tier 2 and Tier 3 mathematics instruction that incorporates visual representations as part of the concrete-representational-abstract (CRA) sequence. The completed planning worksheet serves as a detailed lesson plan to guide implementation and a record for future use.

Planner	
Lesson objective	*(e.g., add fractions with unlike denominators)*
Systematic analysis of problem-solving steps and thinkaloud script notes	*(e.g., ensure that the denominators are the same, multiplying denominator and numerator by same number as necessary; add the numerators, simplify the fraction)*
Choice of concrete materials for demonstration of steps	*(e.g., fractional parts of circles)*
Options for representation for demonstration of steps including sketch	*(e.g., strip diagram)*

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Recommended Practice: Establish a systemwide framework for RtI to support the three recommended practices.

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Key Concepts

- Build a comprehensive framework that addresses reading and mathematics.
- Establish core mathematics instructional programs focused on foundational skills.
- Create leadership teams in districts and schools to facilitate implementation of RtI components.
- Provide professional development and instructional supports to sustain high-quality implementation.

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Establish a system-wide framework for RtI to support the three recommended practices

Expert Interview: The Phases of RtI Implementation (6:12 min)

W. David Tilly III, Ph.D. Director, Innovation and Accountability, Iowa Heartland Area, Education Agency #11

As you listen, record the lessons learned and recommendations made by Dr. Tilly

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Establish a system-wide framework for RtI to support the three recommended practices

- Think-Pair-Share
  - Three lessons learned
  - Recommendations made by Dr. Tilly

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Establish a system-wide framework for RtI to support the three recommended practices.

- Phased Implementation
- Building Infrastructure
- Considers needs of schools and their implementation

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Establish a system-wide framework for RtI to support the three recommended practices

Video: Charting the Path (4:38)

What are potential pitfalls?

What are the recommendations to consider when implementing RtI?

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Establish a system-wide framework for RtI to support the three recommended practices

- Recommendations for avoiding pitfalls
  - Be careful of too many teams operating in the school
  - New leaders need to be thoughtful of what is in place
  - Roles and responsibilities need to be clear
  - Coordination with special education and general education

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Establish a system-wide framework for RtI to support the three recommended practices

- View video: **Principal's Role in Instructional Decision Making (5:48)**
- Listen carefully to the principal's actions that she takes regularly to be sure she is leading the process effectively
- List those actions as you listen

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Establish a system-wide framework for RtI to support the three recommended practices

-Chart key actions and steps taken by principal to ensure high quality implementation of Response to Intervention

-Select one key action that is also happening in your school or you would like to see beginning to happen

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Establish a system-wide framework for RtI to support the three recommended practices

- **RtI Implementation Self Report,** Pennsylvania Department of Education
  - Scan self report used by schools in Pennsylvania to assess and report the current status of implementation
  - How could this tool be of value to you in your current school or district?

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Thank you

- We appreciate your participation and hope you have found this module to be valuable.

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References/Resources

- Doing What Works: http://dww.ed.gov/
- National Mathematics Advisory Panel Final Report: http://www2.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf
- MT RTI website: http://opi.mt.gov/Respurces/RTI/Index.html
- Montana Office of Public Instruction Content Standards: http://www.opi.mt.gov/Curriculum/Index.html

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